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|-------------------------------|------------------------|---------------------|--|
| <b>Notice of Allowability</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                               | 10/006,086             | LUO, FA-LONG        |  |
|                               | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                               | Brian T. Pendleton     | 2644                |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment on 2/7/05.
2. ☒ The allowed claim(s) is/are 1,4-6,9,12-17 and 21-29.
3. ☒ The drawings filed on 05 December 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  6. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date _____ | 7. <input type="checkbox"/> Examiner's Amendment/Comment                               |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material          | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance   |
|   | 9. <input type="checkbox"/> Other _____.   |

## **DETAILED ACTION**

### ***Allowable Subject Matter***

Claims 1, 4-6, 9, 12-17, and 21-29 are allowed.

The following is an examiner's statement of reasons for allowance:

Independent claim 1 recites the feature of a binaural spatial filter for receiving first and second output signals from the spatial filters and outputting a first channel output signal and a second channel output signal without separating each of the first and second output signals into low and high frequency spectrum portions. In light of the specification, the claimed binaural spatial filter reads on figure 4 which illustrates the binaural spatial filter comprising an adder units and adaptive filters 401, 403, which does not separate the processed signals into low and high frequency spectrum portions, as opposed to figure 5, the alternate binaural spatial filter, which does separate the processed signals into low and high frequency spectrum portions. The combination of Welker and Desloge does not disclose nor suggest such a binaural spatial filter.

Matsuo was previously relied upon for rejecting claims 1 and 2, however, claim 1 has been amended to include a first end-fire array comprising a first microphone configured for outputting a first microphone signal, a second microphone for outputting a second microphone signal and a second end-fire array comprising a third microphone configured for outputting a third microphone signal and a fourth microphone for outputting a fourth microphone signal, wherein the spatial filters receive the microphone signals. Matsuo does not disclose nor suggest the use of end-fire microphone arrays. As a result, claim 1 and its dependent claims 4 and 21 are allowed as the prior art references, Welker, Desloge and Matsuo do not teach nor suggest the features detailed above.

Independent claim 5 recites first and second channel spatial filters comprising two fixed polar pattern units, the outputs of which are supplied to a combining unit 311 which contains an adaptive filter. The channel spatial filters suggested by Desloge in figure 1 comprise filters  $W_1(f)$  and  $W_0(f)$ , forming a gradient array. The combination of Desloge and Welker does not disclose nor suggest a spatial filter with two fixed polar patterns and an adaptive filter. Claim 5 and its dependents, claims 6 and 22-25, are allowed.

Independent claim 9 demands that the binaural spatial filter comprise a first combining unit configured for combining the first and second output signals from the channel spatial filters for outputting a reference signal, a first adaptive filter receiving the reference signal and outputting a first adaptive filter output, a second combining unit configured for combining the first output signal with the first adaptive filter output and outputting a first channel output signal, a second adaptive filter configured for receiving the reference signal and outputting a second adaptive filter output and a third combining unit configured for combining the second output signal with the second adaptive filter output for outputting a second channel output signal. The combination of Desloge and Welker disclose a binaural spatial filter in figure 1, but the filter does not form a reference signal for input into first and second adaptive filter and subsequent processing. Therefore, claim 9 and its dependents, claims 26-29 are allowed.

Independent claim 12 similarly recites a left spatial filter having two fixed polar pattern units and a combining unit having an adaptive filter and a right spatial filter having two fixed polar pattern units and a combining unit having an adaptive filter. The combination of Desloge and Welker do not read on this limitation and therefore claim 12 is allowed.

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Independent method claim 13 correspondingly recites providing input signals to a first fixed polar pattern unit and a second fixed polar pattern unit and adaptively combining a first fixed polar pattern unit output and a second fixed polar pattern unit output to form a first channel binaural filter input. The combination of Desloge and Welker do not read on this limitation and therefore claim 13 and its dependents claims 14-17 are allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian T. Pendleton whose telephone number is (571) 272-7527. The examiner can normally be reached on M-F 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on (571) 272-7564. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.


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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Brian T. Pendleton

Examiner

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**BRIAN PENDLETON**  
**PATENT EXAMINER**